

Structure of the U.S. Beekeeping Industry: 1982–2002

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ABSTRACT There have been major structural changes in the beekeeping industry over the past 25 yr. The U.S. Census of Agriculture surveys indicate that colony inventory declined >20% between 1982 and 2002, whereas the number of U.S. farms with apiculture enterprises fell >70%. This decline in farm numbers was not uniform across different sized farms based on colony inventory—nearly 30,000 of the farms exiting the apiculture business had fewer than 25 colonies. With the number of farms declining faster than colony inventory, there has been a shift to larger farms. The Appalachia, Corn Belt, and Northeast states have the highest shares of apiculture farms, whereas the Pacific, Northern Plains, and Mountain states account for the largest shares of colonies. Farms with apiculture enterprises are concentrated in the smallest sales categories—87% of such farms had <\$50,000 in sales in 2002. Only about one third of farms with apiculture activity reported that a majority of sales were from apiculture products—such as honey or colony sales. Compared with all U.S. farms, per farm payments for all types of government programs were smaller for farms with apiculture activities. Only about half of all beekeepers regard farming as their primary occupation, and nearly 60% of the operators work off the farm at least 1 d a year and ≈40% work >200 d off the farm in a given year. Beekeepers resembled all other farmers demographically—nearly 90% are white males, with an average age of 55.

KEY WORDS beekeepers, bee colonies, apiculture farm size and location, apiculture farm operators

The U.S. beekeeping industry is undergoing significant structural and economic change due to a long-term population decline of both managed and native pollinators (National Research Council 2006). Furthermore, the bee industry seems to be shifting from primarily producing honey to providing pollination services as the colony inventory in the United States has declined and pollination fees have increased (Hoff and Willet 1994).

Beekeepers, firms servicing the beekeeping industry, and agricultural policymakers need information on how the U.S. beekeeping industry is organized and how the structure of the industry has changed over time. The Census of Agriculture, conducted every 5 yr by the U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS), is a comprehensive source of information about U.S. farms, including those with apiculture enterprises. By focusing on farms with apiculture activities as covered in the last several Censuses of Agriculture, we can assess trends in, and the current status of, farms that shape the beekeeping industry.

Motivation. In-depth information about the U.S. beekeeping industry has not been reported since a 1994 Economic Research Service (ERS) report com-

prehensively described the structure of the industry (Hoff and Willet 1994). Given the recently reported colony losses from colony collapse disorder (CCD) and concerns about the future of beekeeping in the United States, a historical perspective of the beekeeping industry can be helpful in understanding the structural change process (vanEngelsdorp et al. 2007; USDA Action Plan 2007). Clearly, changes in the organization of the beekeeping industry have economic implications for 1) U.S. honey production, 2) pollination service availability, and 3) production of specialty crops dependent on pollination services.

Several key economic and social concerns have emerged about today's beekeeping farms and their operators:

- Both the long-term decline and more recent acute loss of colonies have raised concerns about the adequacy of the current federal surveys in monitoring U.S. colony inventory levels. The two major surveys conducted by USDA have inherent limitations with respect to estimating colony numbers, especially in light of the recent trend in the industry to provide more pollination services and less honey production. The mobility and multiple locations of beekeeping operations complicate the task of assessing colony inventory levels at a specific place and time during the year. How do the national surveys that report colony inventories compare and what are the potential gaps in the survey data?

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- Past research has suggested that the number of farms with apiculture activity² and the number of bee colonies have both declined (e.g., Hoff and Willet 1994). The beekeeping industry has become more concentrated, with larger operations providing pollination services at multiple sites during the year. Honey production is often associated with small- (25–299 colonies) and medium (300–1,999 colonies)-sized beekeeping operations, but since 1982 larger operations (2,000+ colonies) are becoming more common. What share of colony inventory, honey production, and colony sales are accounted for by very small (<25 colonies) and very large farms with apiculture enterprises and how has that distribution changed over time?
- Given the changes in the temporal and spatial demand for pollination services and the resulting increase in migratory beekeeping, what changes in the regional shares of apiculture farms and colony inventory have occurred as the total U.S. colony inventory declined?
- What are the trends in colony sales over time and by farm size, given the recent concerns about colony losses to CCD and the need to replace colony inventory?
- Economic information about farms with apiculture activity and comparisons with all U.S. farms has not been readily available. What is the gross value of sales for apiculture farms, how are these farms distributed across sales classes, and how does this distribution change as farm size increases?
- Many farms with apiculture activity, especially those with a small number of colonies, are dependent on other farm enterprises to generate revenue to support the entire farming operation. The Census of Agriculture allows us to identify types of farms which are associated with beekeeping activities and examine the extent of specialization in apiculture farming.
- Like most farms, apiculture operations depend on labor and land resources, along with bee colonies, to help generate farm revenue. Compared with all U.S. farms, do beekeepers use the same level of land and labor resources? As the number of colonies owned by a farm increases, does the need for labor and land increase?
- Beekeepers with honey production have been able to participate in various government price support and loan programs for many years. However, information on the number of apiculture farms receiving government payments, payment per farm and by size of farm, and comparisons to all U.S. farms have not been readily available. How dependent are apiculture farms on all types of government payments including Commodity Credit Corporation (CCC) loans?
- Most U.S. farms, especially small farms, depend on

off-farm and/or farm-related income to support the farm household. Are most operators on farms with apiculture enterprises classified as farmers and to what extent do they work off the farm? What share of apiculture farms receive farm-related income and how does that source of income change as farm size increases?

- Demographic information about operators of farms with apiculture operations is helpful in understanding the structure of the pollinator industry. Data on the gender, race, and age of operators of these farms, and how these demographic characteristics differ as the number of colonies on the farm increases, is presented along with comparisons with operators of all U.S. farms.

Objective. This report's objective is to assess the structure of the U.S. beekeeping industry between 1982 and 2002, primarily using U.S. Census of Agriculture data, and focusing on the following:

1. comparisons between the two USDA surveys (i.e., Agricultural Census and annual Honey report [USDA, NASS, Honey reports, 1987–2008]) on trends in the number of bee colonies in the United States since 1982;
2. the changing size and location of U.S. farms engaged in beekeeping activities since 1982;
3. economic and resource use indicators of very small (<25 colonies), small (25–299 colonies), medium (300–1,999 colonies), and large (2,000+ colonies) farms for 2002;
4. operator demographic characteristics for farms with different colony inventory levels in 2002.

Census of Agriculture data are summarized for U.S. farms that report honey production, colony sales, and/or colony inventory for the census years 1982, 1987, 1992, 1997, and 2002 (see *Appendix* for an explanation of the weights used in each census year to produce comparable estimates over time). The Agricultural Census also was conducted in 2007, but those data will not be available for analysis until mid-2009. The 20-yr time period covered by this analysis also documents changes in honey production and colony sales for farms reporting apiculture activity.

U.S. Colony Inventory Trends and Survey Methodology. Reports of widespread bee colony losses due to CCD have been a relatively recent phenomenon, and these losses are of concern given that colony numbers have been falling for several decades. National colony inventory data are available from two USDA surveys—the U.S. Census of Agriculture, conducted every 5 yr; and an annual survey of honey producers (i.e., the Honey report). The annual Honey report adopted its current survey format in 1986 and therefore offers a consistent 22-yr time series, whereas customized tables based on farm-level Agricultural Census reports, as presented in this article, are available beginning with the 1982 census year.

Both surveys indicate significant declines in U.S. honey bee colonies since the 1980s. The census of Agriculture year-end inventory estimate fell from 2.75

² The terms farms with apiculture activities and apiculture farms are used interchangeably in this article. Farms with apiculture activities are defined to be farms that report honey production, colony sales, or colony inventory.

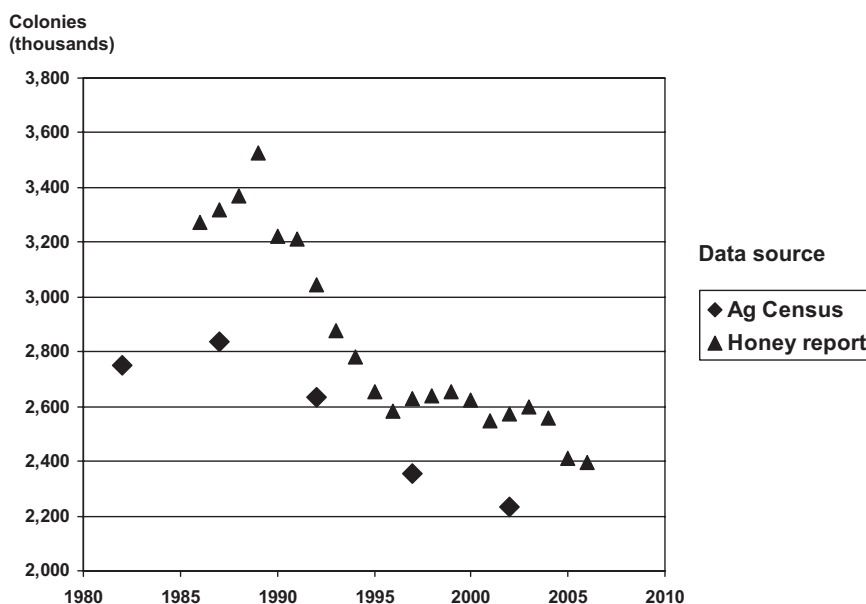


Fig. 1. Total colonies on U.S. farms (Ag Censuses, 1982–2002) and total U.S. honey-producing colonies (annual Honey reports, 1986–2007). (Source: data compiled by USDA, Economic Research Service, using National Agricultural Statistics Service data from the Censuses of Agriculture and annual Honey reports.)

million colonies in 1982 to 2.23 million in 2002. The annual Honey report indicated that the number of colonies used to produce honey declined from 3.27 million in 1986–2.44 million in 2007 (Fig. 1). The steep declines in colony numbers during the late 1980s and early 1990s coincides with the severe infestations of several introduced parasites, such as *Varroa* and tracheal mites, and the diseases they help spread including bee viruses (National Research Council 2006).

Between 2006 and 2007, the annual Honey report indicated an increase of nearly 50,000 colonies despite the reported colony losses due to CCD in 2006 and 2007. Surveys of colony losses due to CCD or other causes typically report the share of colonies lost but not the number of colonies replaced during a given time period. Beekeepers have several options for replacing lost colonies, such as colony splitting and purchases of queens and packages from domestic or foreign sources. Queens and package imports are currently allowed from Canada, Australia, and New Zealand. Hence, the stock of colonies can remain constant or increase even though reported colony losses may be substantial.

Although the trends are similar between the annual Honey report and Census surveys, the estimate of colony numbers differs largely due to differing survey designs, statistical procedures, and purposes. The annual Honey report is designed to collect national and state estimates of honey production, whereas the Agricultural Census collects statistics on U.S. farms, farm operators, and agricultural production. However, these surveys are similar in one respect—neither specifically defines a colony, which implies that respondents use their own judgment about what constitutes

a colony. Colonies can vary widely in terms of frames, bee population, and bee health. According to one source, a standard pollinating colony consists of a Langstroth box of 15,000 active worker bees (Rucker et al. 2008). Another source characterizes a colony as a population of adult bees with a viable queen (by law kept in a movable frame hive) and its population varies naturally (and by intent) throughout the year from 10,000–40,000 workers, which are daughters of the same queen (D. vanEngelsdorp, personal communication).

The annual Honey report survey is designed to collect honey production data but also asks honey producers about the maximum number of colonies used to produce honey during the year. The survey is only administered to beekeepers who produce honey and have five or more honey-producing colonies, which implies that colonies devoted solely to pollination or the production of queens and packaged bees are not recorded by this survey (National Research Council 2006). Furthermore, the annual survey can count the same colony multiple times, i.e., colonies that produce honey in more than one state are included in the national colony total for each state where honey production is reported. Also, the Honey report notes that honey can be harvested from colonies that do not survive.

The Census of Agriculture records colony inventory on 31 December of the census year, which may not be representative of the colony population at other times of the year. Some beekeepers may allow their colony inventory to decline at year's end to avoid the cost of colony overwintering. The census only includes operations defined to be a farm. A farm is defined as any

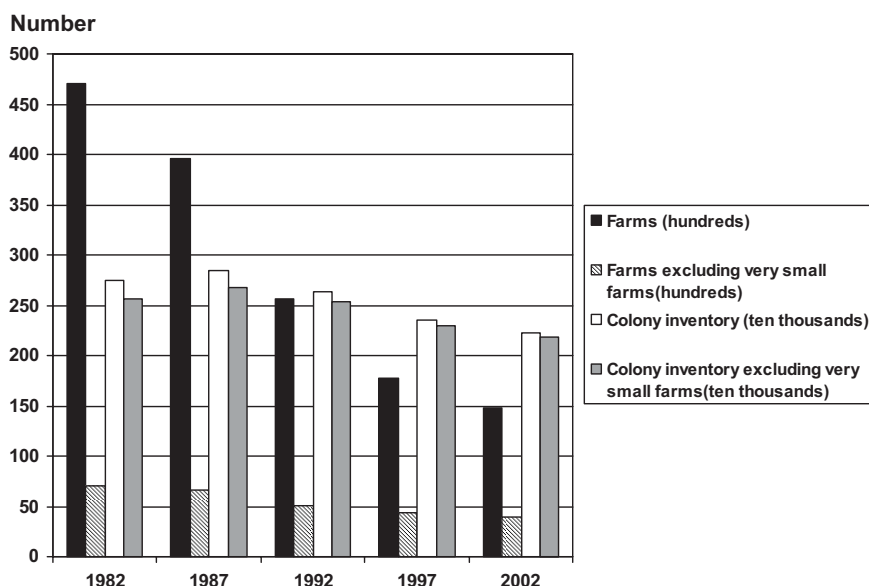


Fig. 2. Farms with apiculture activities and colony inventory, 1982–2002. (Source: data compiled by USDA, Economic Research Service, using National Agricultural Statistics Service data from five Censuses of Agriculture.)

place that produced and sold—or normally would have produced and sold—\$1,000 worth of agricultural products during a given year (Hoppe et al. 2007). Furthermore, the Census of Agriculture does not include operations defined as agricultural services such as businesses that import, produce, and/or sell queens or package bees. Nor are queen breeding operations included in the Agricultural Census. Also, operations that have colonies solely for pollination services are omitted from the Agricultural Census. However, agricultural operations that meet the definition of a farm and have bee colonies used for any purpose would be included in the census.

Beekeeping Industry Structure and Location, 1982–2002. The Agricultural Census data allowed us to track the major structural and regional changes in the beekeeping industry since 1982 including changes in apiculture farms, honey production, colony inventory, and colony sales.

Changes in the Number, Colony Inventory, and Size of Farms with Apiculture Activities. From 1982 through 2002, colony inventory on U.S. farms declined nearly 20%, and the number of farms reporting apiculture activity declined nearly 70%, from $\approx 47,000$ farms to slightly $<15,000$ (Fig. 2; Appendix 1). The decline in such farms was not uniform across all farm sizes where size is measured by colony inventory. The census data allowed us to create detailed farm size classes based on colony inventory and report changes in farm numbers and colonies, including a 1–4 colony inventory class that is NOT part of the annual honey report survey (Appendix 1). Note that between 0.5 and 2.5% of the farms in this analysis, depending on the year, did not report any colony inventory at the end of the year but did report colony sales and/or honey production.

For all five Censuses of Agriculture in our analysis, the largest number of farms (representing $>70\%$ of the total) was in the 1–4 and 5–24 size categories (Fig. 3), but these farms accounted for $<10\%$ of all colonies (Fig. 4). If these very small farms (<25 colonies) are excluded from the total (Fig. 2), the number of colonies is only minimally affected, whereas the number of farms reporting apiculture activity falls from $\approx 7,000$ to near 4,000—a decline of $\approx 40\%$. Clearly, a large number of farms with a small inventory of colonies left the beekeeping business between 1982 and 2002, but the exiting farms accounted for only a small share of all colonies.

Among medium and large farms with apiculture activities, structural change was less dramatic although the total colony inventory for these farms also declined between 1982 and 2002. Although the share of colonies on farms with $<1,000$ colonies declined over this period, the colony shares for farms with between 2,000 and 10,000 colonies increased (Fig. 4). In terms of absolute changes in colony inventory, the largest declines occurred in the 25–299 and 300–999 colony class sizes where inventories fell by over 200,000 and 250,000 colonies, respectively (Fig. 5). During the same time, the 5,000–9,999 colony size class farms increased their inventory level by nearly 140,000 colonies. In general, the three largest farm categories either maintained or increased their share of the total colony inventory and by 2002 accounted for about half of all colonies in the United States, or >1.1 million colonies.

Because the number of farms reporting apiculture activity declined more rapidly than colony inventory, the average farm size increased significantly between 1987 and 2002 (Table 1). The average colony inven-

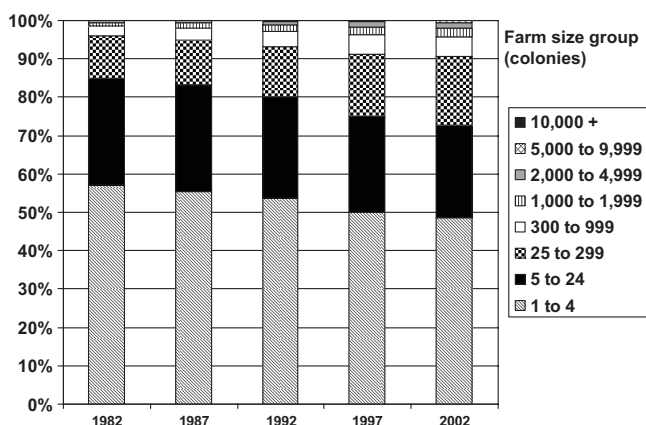


Fig. 3. Distribution of size of farms with apiculture activity, 1982–2002. (Source: data compiled by USDA, Economic Research Service, using National Agricultural Statistics Service data from five Censuses of Agriculture.)

tory rose to 151 colonies per farm from 72—approximately a 110% increase. But because the farm size distribution is so skewed, with many small farms but most colonies on very large farms, this measure does not fully capture changes in the size distribution. To add more information, we also looked at the distribution of colonies by size of farm. At the median of this distribution, half of all colonies were on larger farms and half on smaller farms. We call this median farm “typical,” from the point of view of production or inventory (Hoppe et al. 2007). The typical farm with apiculture activity increased from 1,200 colonies per farm to 2,000 between 1987 and 2002, or approximately a 66% increase. The size of the typical farm with apiculture activities did not increase nearly as rapidly between 1987 and 2002 as did farms growing corn, cotton, bell peppers, and oranges. The 67% increase in apiculture-related farm size was similar to the 55–78% increase experienced by farms with almond, apple, and tomato enterprises.

The Census of Agriculture recorded data on two other attributes of farms with apiculture activities:

honey production and colony sales. Both of these attributes varied by farm size (*Appendix 1*). As expected, the distribution of honey production among farm size classes is highly correlated with colony inventory distribution. However, <40% of farms with fewer than 25 colonies (except for 2002), reported any honey production that may be an indication that much of the honey produced on these farms was for home consumption. Meanwhile, nearly all of the larger farms reported that they produced honey. Colony sales likely reflect either: 1) operations exiting beekeeping (the “no inventory” category in *Appendix 1*) or 2) sales of colonies to other beekeepers for inventory replacement. Reported total colony sales fell precipitously from 1982 to 87 levels of $\approx 600,000$ colonies to $\approx 76,000$ in 2002. But <6% of farms reported colony sales in any year. Although the long-term decline in colony inventory suggests that fewer farms need replacement colonies, the decline in sales may also be due to other factors, such as the following:

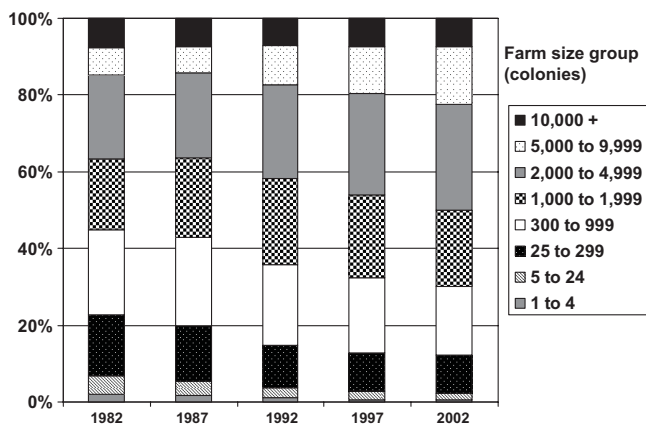


Fig. 4. Distribution of colonies by farm size group, 1982–2002. (Source: data compiled by USDA, Economic Research Service, using National Agricultural Statistics Service data from five Censuses of Agriculture.)

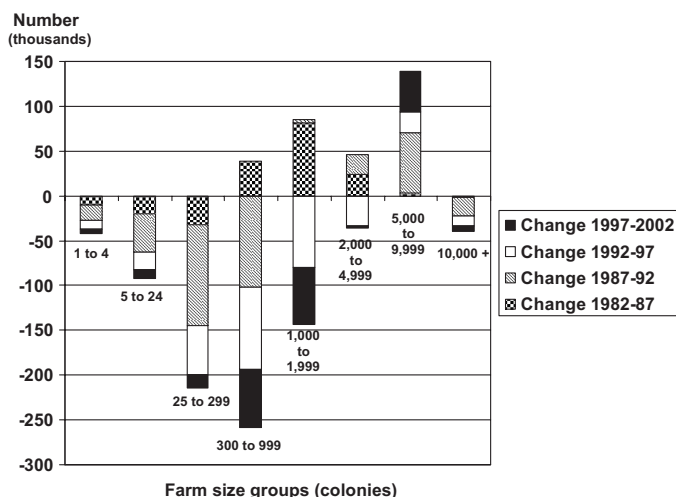


Fig. 5. Change in colony numbers by farm size group, 1982–2002. (Source: data compiled by USDA, Economic Research Service, using National Agricultural Statistics Service data from five Censuses of Agriculture.)

- the closure of the Canadian boarder to U.S. colony exports when tracheal mites were detected in the United States (D. vanEngelsdorp, personal communication);
- an increase in the number of imported colonies;
- beekeepers splitting their own colonies and have less need for buying colonies;
- specialized bee colony producers, which are no longer included in the agricultural census, are providing replacement colonies.

Table 1. Average and typical colony inventory size and comparisons to other selected commodities, 1987–2002

Selected commodity	1987	1992	1997	2002	% change 1987–2002
Apiculture	Colony inventory (colonies per farm)				
Avg. colony inventory	72	103	133	151	109.7
Typical colony inventory ^a	1,200	1,500	1,700	2,000	66.7
Field crops ^b	Typical acres harvested (acres per farm) ^c				
Corn	200	300	350	450	125.0
Wheat	404	562	693	784	94.1
Cotton	450	605	800	920	104.4
Vegetables ^b					
Asparagus	160	200	200	236	47.5
Bell peppers	88	130	180	200	127.3
Tomatoes	400	450	589	700	75.0
Tree crops ^b					
Apples	83	94	122	129	55.4
Almonds	203	234	292	361	77.8
Oranges	450	732	769	1,015	125.6

^a Median colony inventory as of December 31 of census year. Half of all the colonies were on farms with more than the typical number of colonies, and half were on farms with less than the typical number.

^b Source: Hoppe, R., P. Korb, E. O'Donoghue, and D. Banker. Structure and Finances of U.S. Farms: Family Farm Report, 2007 Edition, EIB-24, USDA, Economic Research Service, June 2007.

^c Median acres harvested. Half of all the harvested acres were on farms with more than the typical number of harvested acres, and half were on farms with less than the typical number.

Changes in Geographic Distribution and Colony Inventory of Farms with Apiculture Activities. Even though the beekeeping industry was contracting between 1982 and 2002, regional shares of farms with apiculture activity remained fairly constant, whereas there were some modest changes in the regional shares of colony inventory (Fig. 6)³. The Appalachia, Corn Belt, and Northeast regions have the largest share of farms with apiculture activity and smallest number of colonies per farm, whereas the Northern Plains, Pacific, and Mountain regions have the largest shares of colonies and largest colonies per farm as well as extensive nectar sources (e.g., range and forage acreage) or intensive demand for pollination services (e.g., almond acreage) (Appendix 2). In terms of growth in colonies per farm from 1982 to 2002, farms in the more temperate regions of the Southern Plains, Delta, and Pacific grew the most—more than tripling their average colony size.

Economic and Resource Use Characteristics of Farms with Apiculture Activities, 2002. The Agricultural Census collects farm-level data on a large number of economic and resource use characteristics for farms with apiculture activities. We were especially interested in the gross value of sales, extent of specialization, use of land and labor, government payments, and farm-related income for apiculture farms compared with all U.S. farms.

³ The states within regions are as follows: Northeast: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, and Maryland; Lake: Michigan, Wisconsin, and Minnesota; Corn Belt: Ohio, Indiana, Illinois, Iowa, and Missouri; Northern Plains: North Dakota, South Dakota, Nebraska, and Kansas; Appalachia: Virginia, West Virginia, North Carolina, Kentucky, and Tennessee; Southeast: South Carolina, Georgia, Florida, and Alabama; Delta: Mississippi, Arkansas, and Louisiana; Southern Plains: Oklahoma and Texas; Mountain, Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, and Nevada; and Pacific: Washington, Oregon, California, Alaska, and Hawaii.

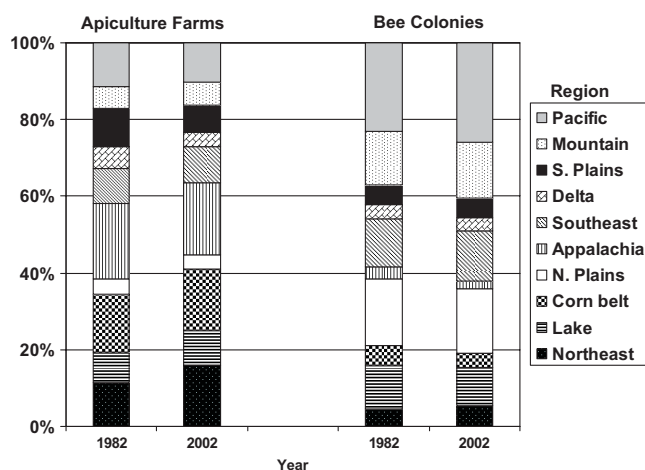


Fig. 6. Regional distribution of apiculture farms and bee colonies, 1982–2002. (Source: data compiled by USDA, Economic Research Service using National Agricultural Statistics Service data from five Censuses of Agriculture.)

Distribution of Farms by Sales Class and Farm Size. The distribution of U.S. farms across different sales categories illustrates the fact that a large share of farms are very small and collectively account for a small share of the value of production (Hoppe et al. 2007). Approximately 60% of all U.S. farms generate <\$10,000 in agricultural product sales annually and approximately another 20% of farms sell between \$10,000 and \$49,999 of production every year. Similarly, a large share of farms with apiculture activity is concentrated in the small sales categories. Nearly 65% of farms are in the smallest sales class and $\approx 22\%$ are in the next smallest class (Table 2)—this sales class categorization includes the value of all agricultural products produced on a farm with apiculture activities, not just sales of apiculture products such as honey and colonies. Small family farms are often defined to have gross value of sales of <\$250,000. By that standard, $\approx 90\%$ of all U.S. farms are considered small family farms, but an even higher proportion of farms with apiculture activity (97%) are considered small.

As expected, farm size and the value of farm sales are positively correlated— $\approx 90\%$ of the farms with <300 colonies generate <\$50,000 in sales, whereas only 10% of the farms with 2,000 or more colonies produce <\$50,000 in sales. The skewed distribution can be illustrated using another size metric in Table 2—colony numbers. Approximately 73% of farms with apiculture activity have <25 colonies but account for only $\approx 2\%$ of all colonies. Less than 2% of farms with apiculture activity have >2,000 colonies, but they account for 50% of all colonies. Part of the differences in sales class distribution of farms and colonies per farm by colony size is linked to the presence of very diverse enterprise activities, besides beekeeping, on farms with a small number of colonies (see next section).

Specialization of Farms with Apiculture Activity by Farm Size. Specialization is another basic descriptor of the farms that make up the apiculture industry. Only

about one third of farms with colonies, colony sales, or honey production generate a majority of their sales from beekeeping activities and are therefore categorized as specialized apiculture operations. Those farms own 93% of all colonies (Table 3). Furthermore, $\approx 36\%$ of farms with some beekeeping activity specialize in livestock operations and $\approx 30\%$ specialize in crop production. This suggests that only a few crop farms own bees for pollination and that most pollination services are provided by migratory beekeepers, who provide pollination services.

Most farms produce several commodities, which reduces risks associated with the production and marketing of a single commodity. Often, the varied enterprises complement each other (e.g., crop production used as an input for livestock production). Most farms involved with apiculture activities, especially those with small colony numbers, do not depend on apiculture products for the majority of their sales. Farms are designated as a specific farm type based on the commodity that constitutes the majority of the farm's total agricultural sales. Only $\approx 14\%$ of farms with <25 colonies are classified as apiculture farms (Table 3). As colony numbers increase to 25–299, $\approx 82\%$ of the farms derive most of their sales from apiculture products. More than 90% of the farms in the two largest colony size classes met the criteria for an apiculture farm. In Table 3, the 2,000+ colony size class is designated as 100% apiculture farms. Due to disclosure restrictions, the seven farms designated as nonapiculture farms in this category were included in other farm type categories. However, a complementary association between certain farm types and apiculture activity is apparent from Table 3. Pollination services are required on many fruit, vegetable and nut farms. Livestock and hay farms typically have range and legume vegetation that serves as a source of nectar for honey production.

The average value of sales (from all sources) per farm was positively correlated with colony numbers,

Table 2. Farms and colony inventory by farm size and sales class, 2002

	Farm size (no. colonies)										Total
	<25		25–299		300–1,999		>2,000				
	% distribution Farms	Colonies per farm	% distribution Farms	Colonies per farm	% distribution Farms	Colonies per farm	% distribution Farms	Colonies per farm	% distribution Farms	Colonies per farm	
No. farms	70.2	72.7	5	69	11.5	7.6	502	— ^a	64.6	10.3	24
% distribution	20.1	17.9	4	131	43.0	34.0	603	— ^a	22.2	21.7	149
No. colonies	4.9	4.5	5	97	24.6	27.0	835	9.8	3,759	16.3	402
% distribution	2.0	1.9	5	67	13.3	19.4	1,113	11.3	3,327	6.2	668
	1.0	1.1	6	100	4.4	6.9	1,192	10.7	3,128	2.9	947
	0.9	0.7	4	60	2.6	4.5	1,295	12.9	3,984	1.5	1,544
	0.5	0.5	5	58	0.5	0.6	806	28.2	27.4	15.5	1,796
	0.4	0.6	8	100	— ^b	— ^b	— ^b	11.7	15.6	0.7	2,181
	100.0	100.0	5	85	100.0	100.0	762	12.3	100.0	6.2	151
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Gross value of sales (\$)											
<10,000											
10,000–49,999											
50,000–99,999											
100,000–174,999											
175,000–249,999											
250,000–499,999											
500,000–999,999											
1 million +											
All											

Source: Data compiled by USDA, Economic Research Service using 2002 Census of Agriculture.

^a Combined with row below.^b Combined with row above.

although there was considerable variation by farm type within the different colony classes. Farms with <25 colonies averaged sales of ≈\$29,000 in 2002, which increased slightly to ≈\$31,000 in the next largest colony class, followed by ≈\$82,000 and \$274,000 in the two largest classes, respectively. Per farm sales for apiculture farms showed similar increases from the smallest to the largest colony class (i.e., ranging from ≈\$3,000 per farm to \$274,000). Given that the average sales for all U.S. farms were ≈\$94,000 in 2002, only the largest apiculture farms exceeded the U.S. average.

Regional Distribution of Farms by Farm Size. The Appalachia, Corn Belt, and Northeast regions have the largest concentration of farms, with <25 colonies on each farm (Table 4). These regions also have the lowest average number of colonies per farm. For the largest colony size class (2,000+), the largest share of farms is located in the Pacific, Northern Plains, and Mountain regions—areas often associated with intensive pollination activity and/or honey production.

Land, Labor, Government Payments, and Farm-Related Income by Farm Size. On average, farms with apiculture activity had significantly fewer total acres and fewer harvested acres than did other U.S. farms—an indication that beekeepers concentrate less on producing crops than most farmers and that owning or renting land is not critical for producing honey or for providing pollination services (Table 5). In general, beekeepers rely on other landowners for land where bee colonies are located. Although 70% of the small apiculture operations also had harvested cropland on them, only ≈14–21% of farms in the two middle-sized colony classes did. Clearly, a large share of the smaller colony size group engaged in farming enterprises other than beekeeping. However, >55% of the large colony farms had harvested cropland, but the acreage that was farmed was relatively modest.

A relatively small share of U.S. farms with apiculture enterprises use hired labor, which is also true of other U.S. farms (Table 5). Slightly >20% of apiculture farms hired workers for <150 d per year and ≈9% hired workers for >150 d per year. As colony inventory per farm increased, the need for hired workers increased (i.e., the share of farms hiring all types of workers rose to >50% for the largest farms). Although the average number of workers hired for both time intervals was between four and five workers, the larger farms had a larger number of all types of workers, with one exception—farms with 25–299 colonies reported hiring an average of 11 workers for >150 d per year. The presence of labor-intensive enterprises on these farms, other than beekeeping, may account for the large labor input.

U.S. farmers are eligible for payments under a variety of federal commodity and conservation programs. Honey producers are most likely to be eligible for payments from the CCC for participating in the honey price support program (Muth et al. 2003). Compared with the U.S. agricultural sector as a whole, farms with beekeeping activities are less likely to receive government payments and of the farms that receive payment, the per-farm average is less than for

Table 3. Farms with apiculture activity: farm type, value of sales, and number of colonies by farm size (number of colonies), 2002

Farms	Value of sales (\$1,000)	Colonies	Value of sales per farm	Colonies per farm
<25 colonies				
Total	10,759	51,938	29,118	5
Farm type	%	%	\$	No.
Oilseeds and grains	5.0	7.2	42,071	4
Vegetables	6.1	7.0	32,944	4
Fruits and tree nuts	8.7	6.6	22,294	5
Hay	8.3	2.5	8,710	4
Other crop	9.8	11.8	35,084	4
Beef cattle	23.0	11.5	14,597	4
Apiary	14.2	1.5	3,144	10
Other livestock	24.9	51.9	60,733	3
All	100.0	100.0	29,118	5
25–299 colonies				
Total	2,633	83,022	223,789	85
Farm type	%	%	\$	No.
Oilseeds and grains	1.2	1.7	45,314	57
Vegetables	1.4	27.3	612,200	63
Fruits and tree nuts	3.8	18.8	156,395	74
Hay ^a	1.6	3.3	65,378	73
Other crop	2.2	5.7	82,613	48
Beef cattle	4.1	4.3	33,295	57
Apiary	81.7	17.1	6,607	90
Other livestock	4.1	21.8	168,896	65
All	100.0	100.0	31,532	85
300–1,999 colonies				
Total	1,109	90,923	890,421	803
Farm type	%	%	\$	No.
Oilseeds and grains	0.9	1.5	133,838	785
Vegetables ^b	0.5	1.3	191,001	941
Fruits and tree nuts ^b	2.5	18.7	607,547	1,422
Other crop ^b	0.7	2.7	306,721	2,526
Beef cattle	0.6	0.4	53,951	602
Apiary	93.6	72.6	63,617	771
Other livestock ^b	1.1	2.8	213,426	962
All	100.0	100.0	81,986	803
2,000+ colonies				
Total	266	72,918	1,068,043	4,015
Farm type	%	%	\$	No.
Apiary	100.0	100.0	274,129	4,015
All				
Total	14,767	560,148	2,234,191	151
Farm type	%	%	\$	No.
Oilseeds and grains	3.9	4.5	43,909	20
Vegetables	4.8	8.1	64,735	16
Fruits and tree nuts	7.2	9.5	50,330	49
Hay	6.3	1.9	11,253	7
Other crop	7.6	7.9	39,463	25
Beef cattle	17.6	7.2	15,482	8
Apiary	33.8	28.2	31,689	418
Other livestock	18.9	32.7	65,506	10
All	100.0	100.0	37,932	151

Source: Data compiled by USDA, Economic Research Service using 2002 Census of Agriculture.

^a Data for the 300–1,999 colony group is combined with the 25–299 group to avoid disclosure.^b Data for the 2,000 and more category of colonies are combined with the 300–1,999 group to avoid disclosure.

all U.S. farms (Table 5). Overall, a relatively small number of all U.S. farms received any government payments in 2002, ranging from 5% receiving CCC loans, 13% receiving Conservation Reserve Program (CRP) and/or Wetlands Reserve Program (WRP) payments, and 25% receiving other federal government payments. A CCC payment is the amount received from the government for all commodities, including honey, placed in the CCC loan program in 2002 even if the commodity was redeemed or forfeited

before 31 December 2002. Other federal farm program payments include loan deficiency payments, support price payments, indemnity programs, disaster payments, paid land diversion, inventory reduction payments, and payments received for approved soil and water conservation projects (excluding CRP and WRP payments).

The share of farms with apiculture enterprises receiving government payments was less than half that for all farms even though honey producers were eligible for

Table 4. Farms and colony inventory by farm size and region, 2002

	Farm size (no. colonies)												Total
	<25			25-299			300-1,999			>2,000			
	% distribution		Colonies per farm	% distribution		Colonies per farm	% distribution		Colonies per farm	% distribution		Colonies per farm	
	Farms	Colonies		Farms	Colonies		Farms	Colonies		Farms	Colonies		
No. farms	23	24	5	12	9	65	2	1	741	d	1	2	16
% distribution	19	17	4	12	11	79	5	3	521	d	1	2	35
No. colonies	3	4	6	6	6	75	3	2	724	4	4	4	131
% distribution	8	8	5	12	13	91	15	16	824	7	5	3	167
	5	4	5	7	7	96	11	14	968	19	17	6	379
Appalachia	17	18	5	15	14	75	8	7	674	2	2	3,240	50
Corn Belt	2	2	5	4	4	94	11	13	924	22	23	4,219	709
Delta	7	7	5	14	17	103	26	25	744	27	29	4,412	382
Lake States	7	8	6	14	16	95	17	15	665	8	11	5,361	212
Mountain	8	7	4	4	3	67	3	3	772	7	7	3,972	107
Northeast	100	100	5	100	100	85	100	100	762	100	100	4,095	151
N. Plains													
Pacific													
Southeast													
S. Plains													
All													

Source: Data compiled by USDA, Economic Research Service using 2002 Census of Agriculture. Note that "d" indicates data was combined with previous column.

participation in the CCC loan program in 2002. Compared with all U.S. farms, per-farm payments for all types of government programs were smaller for farms with bee activities. However, for farms with over 2,000 colonies, per-farm payments were similar to or exceeded the U.S. average payment (e.g., other federal payments averaged >\$36,000 for farms with colonies, but only ≈\$5,000 for all farms).

Nearly 30% of all U.S. farms receive income from farm-related sources (Table 5). For beekeeping farms, pollination service is a potential farm-related source of income. Farm-related income is income from activities that used part of the labor, land, equipment, or capital normally used on the farming or ranching operation and could include pollination revenue. According to the Agricultural Census, this measure records income that is closely related to the agricultural operation and specifically includes animal boarding, breeding fees, tobacco settlements, state fuel tax refunds, federal tax refunds, state tax refunds, local tax refunds, state farm program payments, insurance payments for crop and livestock losses, among others, but excludes sales of crop and livestock products produced on the farm. Farm-related income presented in this article specifically excludes custom-work for other farmers (e.g., plowing, planting, harvesting); cash or share payments; forest products; recreational services; and patronage dividends. Approximately 10% of farms with apiculture activity reported receiving farm-related income and the average income was ≈\$12,000 for these farms compared with ≈\$9,400 for all farms. However, as colony numbers increased, the average farm-related income rose from \$6,400 to nearly \$115,000 for the 2,000+-sized farm. For these large farms, farm-related income possibly from pollination fees, added substantially to their total gross income.

Operator Demographic Characteristics of Farms with Apiculture Activities, 2002. Operator characteristics of farms with apiculture activities did not differ dramatically from those of all U.S. farm operators in 2002. However, for those farms with beekeeping enterprises, there were some notable differences by farm size (Table 6). The racial and gender distribution of all farms with apiculture operations was very similar to all U.S. farms. However, the share of female operators declined as colony size increased. Relative to all U.S. farmers, a smaller share of operators of apiculture farms had farming as their principal occupation but as farm size increased to >2,000 colonies, >70% of operators were farmers. The average age of the entire group of apiculture operators was the same as for all farm operators (55 yr of age) but the distribution was somewhat different—a smaller share of apiculture farms had operators >65 but had a larger share of operators between 45 and 54. More than 50% of all farmers engaged in apiculture activities began operating a farm between 1975 and 1994, whereas the share of operators beginning operations since 1994 declined as colony size increased—an indication that beginning farmers tend to start their businesses with smaller colony numbers. In general, operators of the largest farms with apiculture activity tend to be white males

Table 5. Economic and resource use indicators of farms with apiculture activities by farm size, 2002

Farms with land	Farm size (no. colonies)										Total			All U.S. farms	
	<25		25-299		300-1,999		2,000+		Farms	Acres per farm	Workers per farm	Farms	Acres per farm	Workers per farm	Share of all U.S. farms
	Farms	Acres per farm	Farms	Acres per farm	Farms	Acres per farm	Farms	Acres per farm							
Any land Harvested cropland Share of farms with cropland	10,759	177	2,631	89	1,104	66	273	101	152	441	14,767	152	441	Share of all U.S. farms	
	7,535	65	562	107	156	129	39	169	69	222	8,292	69	222		
	70.0%		21.4%		14.1%		14.3%				56.2%			64%	
Labor	Farms	Workers per farm	Farms	Workers per farm	Farms	Workers per farm	Farms	Workers per farm	Farms	Workers per farm	Farms	Workers per farm	Workers per farm	Share of all U.S. farms	
Farms with hired workers															
	2,203	4	461	5	367	4	141	7	5	5	3,172	5	5	21%	
	20.5%		17.5%		33.2%		51.6%				21.5%				
	852	3	91	11	181	3	147	5	4	4	1,271	4	4	10%	
Share of farms	7.9%		3.5%		16.4%		53.8%				8.6%				
Farms with government payments	Farms	Payment per farm	Farms	Payment per farm	Farms	Payment per farm	Farms	Payment per farm	Farms	Payment per farm	Farms	Payment per farm	Payment per farm	Share of all U.S. farms	
CCC loans ^a Share of farms CRP and WRP payments ^b Share of farms Other federal payments Share of farms	170	12,032	42	10,799	34	15,370	12	36,530	13,411	36,122	258	13,411	36,122	5%	
	1.6%		1.6%		3.1%		4.4%		1.7%		1.7%				
	669	3,244	68	3,369	23	3,396	10	4,141	3,271	5,136	770	3,271	5,136		
	6.2%		2.6%		2.1%		3.7%		5.2%		5.2%			13%	
1,564	4,314	149	6,676	55	7,864	22	36,190	5,011	9,707	9,707	1,790	5,011	9,707	25%	
14.5%		5.7%			5.0%		8.1%				12.1%				
Farms with farm-related income	Farms	Income per farm	Farms	Income per farm	Farms	Income per farm	Farms	Income per farm	Farms	Income per farm	Farms	Income per farm	Income per farm	Share of all U.S. farms	
Total Share of farms	1,090	6,454	180	11,201	111	30,016	39	114,891	11,876	9,421	1,420	11,876	9,421	29%	
	10.1%		6.8%		10.1%		14.3%				9.6%				

Source: Data compiled by USDA, Economic Research Service using 2002 Census of Agriculture.

^a CCC, Commodity Credit Corporation.^b CRP, Conservation Reserve Program; WRP, Wetlands Reserve Program.

Table 6. Farm operator characteristics by farm size, 2002

	Farm size (no. colonies)					All U.S. farms
	<25	25-299	300-1,999	2,000+	Total	
No. farms	10,759	2,631	1,104	273	14,767	2,128,982
			%			
Principal occupation						
Farming	50.5	43.3	59.3	70.7	50.3	57.5
Other	49.5	56.7	40.7	29.3	49.7	42.5
All	100.0	100.0	100.0	100.0	100.0	100.0
Yr began farming						
Before 1955	3.4	3.2	3.4	2.2	3.3	na
1955-1974	16.6	19.5	22.0	27.1	17.7	na
1975-1994	51.8	54.0	56.6	56.8	52.6	na
Since 1994	28.2	23.3	17.9	13.9	26.3	na
All	100.0	100.0	100.0	100.0	100.0	na
No. days worked off-farm/yr						
None	38.6	44.9	64.1	76.9	42.3	45.2
1-199	19.8	18.8	15.2	9.2	19.0	15.7
200 or more	41.7	36.3	20.7	13.9	38.6	39.1
All	100	100	100	100	100	100.0
Gender						
Male	87.7	92.9	95.1	95.6	89.3	88.8
Female	12.3	7.1	4.9	4.4	10.7	11.2
All	100.0	100.0	100.0	100.0	100.0	100.0
Race						
White	98.5	99.1	99.4	99.6	98.7	97.2
Native American	1.0	0.3	0.5	0.0	0.8	0.8
Other	0.4	0.5	0.2	0.4	0.5	2.0
All	100	100	100	100	100	100.0
Age of operator						
Under 35	4.1	3.4	5.5	5.1	4.1	5.8
35-44	19.3	14.8	16.8	20.5	18.3	17.2
45-54	29.9	26.3	34.1	35.9	29.7	26.9
55-64	24.4	29.0	25.5	23.4	25.3	23.9
65+	22.3	26.5	17.9	15.0	22.6	26.2
All	100.0	100.0	100.0	100.0	100.0	100.0
Avg. operator age	54	56	54	52	55	55

Source: Data compiled by USDA, Economic Research Service using 2002 Census of Agriculture.
na, not available.

who regard farming as a full-time occupation with little off-farm work; they have been in farming between 10 and 30 yr; and are slightly younger than operators with smaller colony inventory.

Summary and Conclusions. Although recent reports have documented larger than normal U.S. bee colony losses due to CCD and other causes in 2006 and 2007, the decline in U.S. colony inventory over the past 20 yr has been even more severe. USDA's annual Honey report survey and the Census of Agriculture (taken once every 5 yr) indicate declines of between 20 and 30% in colony numbers, depending on the survey. However, due to the restricted structure and limited purpose of these two surveys, the actual number of colonies available for honey production and/or pollination in the U.S. is likely higher than these estimates. The annual Honey report survey is limited to honey producers with five or more colonies and counts the same colony each time it produces honey in a different state. The Agricultural Census is restricted by the definition of a farm and only records colonies on the farm on the last day of the Census year. Both of these surveys exclude colonies on apiary operations that are solely involved with pollination or bee breeding. The double counting of colonies in the

Honey report survey and the reporting of colony inventory at the end of the year for farms in the Agricultural Census likely accounts for the larger number of colonies reported in the Honey report. It should be noted that the recent non-USDA surveys on colony losses are not structured to measure the ability of beekeepers to rapidly replenish their lost colony inventory through colony splitting or purchases of colonies from domestic or foreign suppliers.

There have been major structural changes in the beekeeping industry over the past 25 yr. With the number of apiculture farms declining faster than colony inventory, there has been a shift to larger but fewer farms with apiculture activities. The decline in farms with colonies has been concentrated in the noncommercial segment of the industry, on farms with <25 colonies. This shift in beekeeping is in line with that observed among other agricultural commodities. The changing size structure of the industry suggests that small beekeeping enterprises are not economically viable compared with larger apiculture operations—a phenomenon that may be related to the large-scale migratory-oriented operations that are needed to service the growing pollination market. Even though the beekeeping industry shrank between 1982

and 2002, we found that the regional shares of farms with apiary activity remained fairly constant, with only modest changes in the regional shares of colony inventory.

In light of the recent reports of colony losses, the number of colony sales reported in the Census of Agriculture is also of interest. As the demand for replacement colonies increases in the near term, the trend in colony sales based on the Census of Agriculture seems to be heading in the opposite direction. The sharp decline since the 1980s is probably related to the closing of the Canadian border to U.S. colony exports. Another explanation is that because the agricultural census does not include agricultural services, such as bee breeding operations, the agricultural census data are no longer fully capturing annual sales of replacement colonies.

Compared with all U.S. farms, farms with apiculture activity are relatively small, based on gross value of sales—87% of such farms had <\$50,000 in sales in 2002. More than 70% of colonies are on small family farms, which are defined as having <\$250,000 in sales. The majority of colonies (>90%) are on farms that specialize in apiculture activities, which suggest that most pollinator-dependent crop farms rent rather than own bee colonies for pollination services. A complementary association between certain farm types and apiculture activity was apparent from the data. Pollination services are required on many fruit, vegetable, and tree nut farms, whereas livestock and hay farms produce vegetation that serves as nectar sources for honey production. Apiculture farming is less land-intensive and somewhat more labor-intensive than other types of farming—even for the largest apiculture operations land is not a major input. Government payments, such as those from the CCC for participating in the honey program, are less common and smaller for farms with apiculture activity than for U.S. farms overall. Farm-related income is less important for most beekeepers, but for the largest farms, such income can be substantial and may be related to revenue from pollination services.

Operators of farms with beekeeping activities are very similar to all U.S. farm operators, demographically as well in their reliance on income sources other than farming. Beekeepers, on average, were predominantly white males with an average age of 55. However, farm operators with >2,000 colonies tended to be more economically dependent on farming; receive significantly more farm-related income; and slightly younger.

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Appendix: Weighting the Census of Agriculture Data for Consistent Estimates Over Time. The U.S. Census of Agriculture is a major source of statistical data for U.S. farms and farm operators. It provides a comprehensive picture of the current situation in agriculture as it collects information on agricultural structure and characteristics for every state and county in the United States. Currently conducted every 5 yr by USDA's NASS, the Census of Agriculture data are collected through survey questionnaires that are completed either by personal interview or by mail. Before 1997, the census was conducted by the U.S. Department Commerce's Census Bureau. Currently, ERS researchers have access to data from six full

censuses: the 1978, 1982, 1987, 1992, 1997 and 2002 census files. Data from the 2007 census will be available in mid-2009.

Despite extensive efforts to obtain survey responses from every farm in the United States, in reality it is very difficult to achieve full response on this or any other survey. Farms may be missing from the Census of Agriculture mailing list, or farm operators may choose not to respond to the agricultural census survey. Adjustments are therefore needed to include estimated answers for those who should have but did not file a Census of Agriculture survey. Before 2002, a farm answering the survey would be counted either once or twice (weighted

1 or 2). A farm might be assigned a weight of two to account for a similar farm that should have responded to the NASS survey, but for whatever reason, refused (termed a whole farm nonresponse). It would then be counted twice in the total numbers; once for its own survey and once to represent a missing farm. From 1982 through 1997, these nonresponse weights were the official publication weights, and were used in all tables and calculations.

In 2002, NASS undertook additional steps to uncover missing respondents by conducting extensive area surveys. In these cases, large geographic areas measuring approximately a square mile, were sampled throughout the United States and completely canvassed by survey enumerators. Those geographically sampled farms were matched to the census mailing list. Unmatched farms were contacted to determine whether they had received a census form. Farms that had not received a census form represented farms not on the mail list (NML). Most of the NML farms were small in acreage, production, and sales, and the percentage of these missing farms varied by state. Including survey information on the NMLs led to the development of a new weight called the coverage adjustment weight. All published data for 2002 uses the coverage adjustment weights, and retroactively, the 1997 county level data are also adjusted in the 2002 tables using the newer weights. (For more information, see Appendix C of the 2002 Census of Agriculture.)

The new coverage adjustment, although possibly creating a more thorough and complete overall total, has presented difficulties in comparing 2002 agricultural individual farm level data with previous census years. The nonresponse weight algorithms that were applied in the previous censuses, do not work well for 2002, possibly because of the small farm "under-coverage." Also it is possible that the original NASS mailing list might have included proportionately fewer small farms in 2002 than in previous years, resulting in estimates that are distorted or decreased if the weights were applied as in previous years. Many of the undercounted farms were small and much of the new coverage occurs in smaller farms, so future research on apiary operations and any other small farms should take those factors into account.

Recent NASS research resulted in the development of an intermediate weight that combines portions of the old weighting scheme and the new coverage-adjusted weights to produce an estimate that might better represent the 2002 data in the context of the previous 20 yr. Although not matching the published totals for 2002, this intermediate weight produces numbers more consistent with the 1982–1997 series. The intermediate weight is the one used for the 2002 apiary data in this report. Therefore, tables in this report that present 2002 total numbers may not match the 2002 NASS publications. In addition, the definition of apiary farms used in this report encompasses a slightly broader scope than the definition used in the 2002 Census of Agriculture publications.

Appendix 1. Colony inventory, colonies sold and honey produced on U.S. farms by farm size, 1982

	Farm size (no. colonies)										
	No inventory	1–4	5–24	25–299	300–999	1,000–1,999	2,000–4,999	5,000–9,999	10,000+	All	
No. farms ^a	282	26,597	13,191	5,209	1,184	392	213	33	14	47,115	
Distribution by size	0.6%	56.5%	28.0%	11.1%	2.5%	0.8%	0.5%	0.1%	0.0%	100.0%	
No. colonies	na	55,266	130,531	436,638	617,333	502,935	604,718	195,116	208,483	2,751,020	
Distribution by size	na	2%	5%	16%	22%	18%	22%	7%	8%	100%	
No. colonies per operation	na	2	10	84	521	1283	2839	5913	14892	1,935	
No. farms with colonies sold	282	534	476	423	120	41	48	4	7	1,935	
Distribution by size	14.6%	27.6%	24.6%	21.9%	6.2%	2.1%	2.5%	0.2%	0.4%	100.0%	
No. colonies sold	28,976	4,922	14,098	61,496	49,505	60,072	190,298	45,680	135,835	590,882	
Distribution by size	4.9%	0.8%	2.4%	10.4%	8.4%	10.2%	32.2%	7.7%	23.0%	100.0%	
No. colonies sold per farm	103	9	30	145	413	1465	3905	11420	19405	305	
Share of farms with colonies sold	100.0%	2.0%	3.6%	8.1%	10.1%	10.5%	22.5%	12.1%	50.0%	4.1%	
No. farms with honey produced	36	1,251	2,575	5,176	1,173	389	211	33	14	10,858	
Distribution by size	0.3%	11.5%	23.7%	47.7%	10.8%	3.6%	1.9%	0.3%	0.1%	100.0%	
No. colonies producing honey	na	3,427	28,930	432,994	612,233	499,235	598,218	195,116	208,483	2,578,636	
Honey produced (thous. pounds)	465	117	1,135	19,604	34,501	32,214	39,981	12,153	11,538	151,706	
Distribution by size	0.3%	0.1%	0.7%	12.9%	22.7%	21.2%	26.4%	8.0%	7.6%	100.0%	
Honey produced per farm (pounds)	12,925	93	441	3,788	29,412	82,811	189,482	368,264	824,112	13,972	
Share of farms with honey production	12.8%	4.7%	19.5%	99.4%	99.1%	99.2%	99.1%	100.0%	100.0%	23.0%	

Source: data compiled by USDA, Economic Research Service using 1982 Census of Agriculture.

^a Farms with colony inventory, colonies sold, or honey produced.

Appendix 1 (continue). Colony inventory, colonies sold and honey produced on U.S. farms by farm size, 1997

	Farm size (no. colonies)									
	No inventory	1-4	5-24	25-299	300-999	1000-1999	2000-4999	5000-9999	10,000+	All
No. farms ^a	189	8,652	4,428	2,558	868	386	220	46	11	17,658
Distribution by size	1.1%	49.0%	25.1%	16.2%	4.9%	2.2%	1.2%	0.3%	0.1%	100.0%
No. colonies	na	17,545	47,626	236,643	462,424	508,313	617,450	288,831	174,637	2,353,469
Distribution by size	na	0.7%	2.0%	10.1%	19.6%	21.6%	26.2%	12.3%	7.4%	100.0%
No. colonies per operation	na	2	11	83	533	1,317	2,807	6,279	15,876	133
No. farms with colonies sold	189	241	178	163	84	22	25	8	na	910
Distribution by size	20.8%	26.5%	19.6%	17.9%	9.2%	2.4%	2.7%	0.9%	na	100.0%
No. colonies sold	21,082	14,288	11,131	38,485	108,675	16,324	89,210	81,268	na	380,463
Distribution by size	5.5%	3.8%	2.9%	10.1%	28.6%	4.3%	23.4%	21.4%	na	100.0%
No. colonies sold per farm	112	59	63	236	1,294	742	3,568	10,159	na	418
Share of farms with colonies sold	100.0%	2.8%	4.0%	5.7%	9.7%	5.7%	11.4%	17.4%	na	5.2%
No. farms with honey produced	93	1,409	1,829	2,840	860	384	217	46	10	7,688
Distribution by size	1.2%	18.3%	23.8%	36.9%	11.2%	5.0%	2.8%	0.6%	0.1%	100.0%
No. colonies producing honey	na	3,468	20,729	234,957	458,624	506,313	607,850	288,831	162,137	2,282,907
Honey produced (thous. Pounds)	1,268	203	1,224	15,014	31,455	37,479	43,037	20,970	8,294	158,944
Distribution by size	0.8%	0.1%	0.8%	9.4%	19.8%	23.6%	27.1%	13.2%	5.2%	100.0%
Honey produced per farm (pounds)	13,637	144	669	5,286	36,576	97,602	198,328	455,860	829,428	20,674
Share of farms with honey production	49.2%	16.3%	41.3%	99.4%	99.1%	99.5%	98.6%	100.0%	90.9%	43.5%

Source: data compiled by USDA, Economic Research Service using 1997 Census of Agriculture.

^a Farms with colony inventory, colonies sold, or honey produced.

Appendix 1 (continue). Colony inventory, colonies sold and honey produced on U.S. farms by farm size, 2002

	Farm size (no. colonies)									
	No inventory	1-4	5-24	25-299	300-999	1000-1999	2000-4999	5000-9999	10,000+	All
No. farms ^a	242	6,951	3,566	2,631	771	333	212	52	9	14,767
Distribution by size	1.6%	47.1%	24.1%	17.8%	5.2%	2.3%	1.4%	0.4%	0.1%	100.0%
No. colonies	na	13,871	38,068	222,671	397,555	444,112	615,914	334,319	167,682	2,234,191
Distribution by size	na	0.6	1.7%	10.0%	17.5%	19.9%	27.6%	15.0%	7.5%	99.4%
No. colonies per operation	na	2	11	85	516	1,334	2,905	6,429	18,631	151
No. farms with colonies sold	235	73	133	227	51	32	13	10	na	773
Distribution by size	30.4%	9.4%	17.2%	39.4%	6.6%	4.1%	1.7%	1.3%	na	100.1%
No. colonies sold	12,107	324	2,584	15,757	8,344	12,240	5,943	19,098	na	76,398
Distribution by size	15.8%	0.4%	3.4%	20.6%	10.9%	16.0%	7.8%	25.0%	na	100.0%
No. colonies sold per farm	52	4	19	69	164	383	457	1,910	na	99
Share of farms with colonies sold	97.1%	1.1%	3.7%	8.6%	6.6%	9.6%	6.1%	19.2%	na	5.2%
No. farms with honey produced	66	2,649	3,338	2,631	771	333	212	52	9	10,062
Distribution by size	0.7%	26.3%	33.2%	26.1%	7.7%	3.3%	2.1%	0.5%	0.1%	100.0%
No. colonies producing honey	na	6,230	36,932	222,671	397,555	444,112	615,914	334,319	167,682	2,225,413
Honey produced (thous. pounds)	379	1,758	1,461	11,626	26,096	28,370	35,854	17,058	5,874	128,475
Distribution by size	0.3%	1.4%	1.1%	9.0%	20.3%	22.1%	27.9%	13.3%	4.6%	100.0%
Honey produced per farm (pounds)	5,736	664	438	4,419	33,847	85,194	169,121	328,033	652,684	12,768
Share of farms with honey production	27.3%	38.1%	93.6%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	68.1%

na, not applicable or data combined with another farm size to avoid disclosure.

Source: data compiled by Economic Research Service using data from the 2002 Census of Agriculture.

^a Farms with colony inventory, colonies sold, or honey produced.

Appendix 2. Colony inventory, colonies sold or honey produced on U.S. farms by region, 1982

	Region						
	Northeast	Lake states	Corribelt	North Plains	Appalachia	Southeast	Delta
Farms (no.) ^a	5,395	3,774	7,099	1,819	9,291	4,275	2,707
Distribution by region	11.5%	8.0%	13.1%	3.9%	19.7%	9.1%	5.7%
Colonies (no.)	125,355	313,523	138,862	479,693	89,589	339,393	101,253
Distribution by region	4.6%	11.4%	5.0%	17.4%	3.3%	12.3%	3.7%
Colonies per farm (no.)	23	83	20	264	10	79	37
Farms selling colonies (no.)	235	160	221	80	308	202	121
Distribution by region	12.1%	8.3%	11.4%	4.1%	15.9%	10.4%	6.3%
Colonies sold (no.)	10,752	20,522	8,983	52,028	7,482	192,389	24,714
Distribution by region	1.8%	3.5%	1.5%	8.8%	1.3%	32.6%	4.2%
Colonies sold per farm (no.)	46	128	41	650	24	952	204
Share of farms selling colonies	4.4%	4.2%	3.1%	4.4%	3.3%	4.7%	4.5%
Honey producing farms (no.)	1,380	1,414	1,255	703	1,055	1,136	452
Distribution by region	12.7%	13.0%	11.6%	6.5%	9.7%	10.5%	4.2%
Colonies producing honey (no.)	109,436	300,596	116,261	473,878	55,537	320,908	92,365
Honey produced (thous. pounds)	5,238	18,968	5,928	35,369	2,478	16,571	5,550
Distribution by region	3.5%	12.5%	3.9%	23.3%	1.6%	10.9%	3.7%
Honey produced per farm (pounds)	3,795	13,415	4,723	50,312	2,349	14,587	12,279
Share of farms producing honey	25.6%	37.5%	17.7%	38.6%	11.4%	26.6%	16.7%

Source: data compiled by USDA, Economic Research Service using 1982 Census of Agriculture.

^a Farms with colony inventory, colonies sold, or honey produced.

Appendix 2 (continue). Colony inventory, colonies sold or honey produced on U.S. farms by region, 1987

	Region						
	Northeast	Lake states	Corribelt	North Plains	Appalachia	Southeast	Delta
Farms (no.) ^a	4,617	3,011	6,127	1,568	8,166	3,615	2,112
Distribution by region	11.7%	7.6%	13.5%	4.0%	20.6%	9.1%	5.3%
Colonies (no.)	128,160	333,578	140,634	489,693	79,413	333,674	111,086
Distribution by region	4.5%	11.8%	5.0%	17.3%	2.8%	11.8%	3.9%
Colonies per farm (no.)	28	111	23	312	10	92	53
Farms selling colonies (no.)	264	224	306	103	309	208	113
Distribution by region	12.1%	10.3%	14.0%	4.7%	14.1%	9.5%	5.2%
Colonies sold (no.)	7,669	35,634	8,917	28,561	6,597	136,293	9,094
Distribution by region	1.2%	5.8%	1.4%	4.6%	1.1%	22.0%	1.5%
Colonies sold per farm (no.)	29	159	29	277	21	655	80
Share of farms selling colonies	5.7%	7.4%	5.0%	6.6%	3.8%	5.8%	5.4%
Honey producing farms (no.)	1,740	1,728	2,081	828	2,147	1,464	578
Distribution by region	11.8%	11.7%	14.1%	5.6%	14.6%	9.9%	3.9%
Colonies producing honey (no.)	115,672	326,169	125,152	486,039	54,044	324,586	104,675
Honey produced (thous. pounds)	5,077	28,853	8,277	49,433	2,262	23,419	7,087
Distribution by region	2.7%	15.2%	4.3%	26.0%	1.2%	12.3%	3.7%
Honey produced per farm (pounds)	2,918	16,697	3,977	59,702	1,054	15,997	12,261
Share of farms producing honey	37.7%	57.4%	34.0%	52.8%	26.3%	40.5%	27.4%

Source: data compiled by USDA, Economic Research Service using 1987 Census of Agriculture.

^a Farms with colony inventory, colonies sold, or honey produced.

Appendix 2 (continue). Colony inventory, colonies sold or honey produced on U.S. farms by region, 1992

	Region										
	Northeast	Lake states	Cornbelt	North Plains	Appalachia	Southeast	Delta	South Plains	Mountain	Pacific	All
Farms (no.) ^a	3,357	2,153	3,895	1,135	4,698	1,921	1,078	2,642	1,714	3,023	25,616
Distribution by region	13.1%	8.4%	15.2%	4.4%	18.3%	7.5%	4.2%	10.3%	6.7%	11.8%	100.0%
Colonies (no.)	117,210	319,324	134,396	449,011	46,548	300,859	101,589	149,712	371,073	643,616	2,633,338
Distribution by region	4.5%	12.1%	5.1%	17.1%	1.8%	11.4%	3.9%	5.7%	14.1%	24.4%	100.0%
Colonies per farm (no.)	35	148	35	396	10	157	94	57	216	213	103
Farms selling colonies (no.)	144	111	156	66	132	108	33	101	110	178	1,139
Distribution by region	12.6%	9.7%	13.7%	5.8%	11.6%	9.5%	2.9%	8.9%	9.7%	15.6%	100.0%
Colonies sold (no.)	5,442	18,944	8,288	27,055	2,996	61,971	3,305	71,495	29,256	184,477	413,229
Distribution by region	1.3%	4.6%	2.0%	6.5%	0.7%	15.0%	0.8%	17.3%	7.1%	44.6%	100.0%
Colonies sold per farm (no.)	38	171	53	410	23	574	100	708	266	1036	363
Share of farms selling colonies	4.3%	5.2%	4.0%	5.8%	2.8%	5.6%	3.1%	3.8%	6.4%	5.9%	4.4%
Honey producing farms (no.)	1,254	1,273	1,228	631	968	816	350	805	840	1,511	9,676
Distribution by region	13.0%	13.2%	12.7%	6.5%	10.0%	8.4%	3.6%	8.3%	8.7%	15.6%	100.0%
Colonies producing honey (no.)	106,024	314,445	122,868	446,138	32,823	296,244	98,312	138,658	364,883	623,443	2,543,838
Honey produced (thous. pounds)	5,804	25,669	6,653	39,675	1,199	21,259	7,610	9,782	25,516	40,222	183,389
Distribution by region	3.2%	14.0%	3.6%	21.6%	0.7%	11.6%	4.1%	5.3%	13.9%	21.9%	100.0%
Honey produced per farm (pounds)	4,628	20,164	5,418	62,877	1,238	26,053	21,744	12,151	30,376	26,620	18,953
Share of farms producing honey	37.4%	59.1%	31.5%	55.6%	20.6%	42.5%	32.5%	30.5%	49.0%	50.0%	37.8%

Source: data compiled by USDA, Economic Research Service using 1992 Census of Agriculture.

^a Farms with colony inventory, colonies sold, or honey produced.

Appendix 2 (continue). Colony inventory, colonies sold or honey produced on U.S. farms by region, 1997

	Region										
	Northeast	Lake states	Cornbelt	North Plains	Appalachia	Southeast	Delta	South Plains	Mountain	Pacific	All
Farms (no.). ^a	2,714	1,708	2,631	770	2,931	1,556	634	1,303	1,334	2,077	17,658
Distribution by region	15.4%	9.7%	14.9%	4.4%	16.6%	8.8%	3.6%	7.4%	7.6%	11.8%	100.0%
Colonies (no.)	110,516	270,976	93,129	418,067	37,866	319,327	75,822	110,684	358,935	558,147	2,353,469
Distribution by region	4.7%	11.5%	4.0%	17.8%	1.6%	13.6%	3.2%	4.7%	15.3%	23.7%	100.0%
Colonies per farm (no.)	41	159	35	543	13	205	120	85	269	269	133
Farms selling colonies (no.)	137	104	124	46	117	77	25	73	82	125	910
Distribution by region	15.1%	11.4%	13.6%	5.1%	12.9%	8.5%	2.7%	8.0%	9.0%	13.7%	100.0%
Colonies sold (no.)	33,091	33,895	7,395	12,687	7,506	37,758	7,008	106,803	40,492	93,828	380,463
Distribution by region	8.7%	8.9%	1.9%	3.3%	2.0%	9.9%	1.8%	28.1%	10.6%	24.7%	100.0%
Colonies sold per farm (no.)	242	326	60	276	64	490	280	1463	494	751	418
Share of farms selling colonies	5.0%	6.1%	4.7%	6.0%	4.0%	4.9%	3.9%	5.6%	6.1%	6.0%	5.2%
Honey producing farms (no.)	1,186	969	1,023	468	736	833	220	431	630	1,192	7,688
Distribution by region	15.4%	12.6%	13.3%	6.1%	9.6%	10.8%	2.9%	5.6%	8.2%	15.5%	100.0%
Colonies producing honey (no.)	104,126	233,816	86,725	416,415	29,999	313,165	74,125	106,926	349,278	535,332	2,282,907
Honey produced (thous. pounds)	6,455	18,995	5,915	31,085	1,179	20,639	5,798	8,612	24,032	36,234	158,944
Distribution by region	4.1%	12.0%	3.7%	19.6%	0.7%	13.0%	3.6%	5.4%	15.1%	22.8%	100.0%
Honey produced per farm (pounds)	5,443	19,602	5,782	66,422	1,601	24,776	26,356	19,981	38,146	30,398	20,674
Share of farms producing honey	43.7%	56.7%	38.9%	60.8%	25.1%	53.5%	34.7%	33.1%	47.2%	57.4%	43.5%

Source: data compiled by USDA, Economic Research Service using 1997 Census of Agriculture.

^a Farms with colony inventory, colonies sold, or honey produced.

Appendix 2 (continue). Colony inventory, colonies sold or honey produced on U.S. farms by region, 2002

	Region										
	Northeast	Lake states	Cornbelt	North Plains	Appalachia	Southeast	Delta	South Plains	Mountain	Pacific	All
Farms (no.) ^a	2,352	1,355	2,357	531	2,795	1,362	577	1,062	858	1519	14,767
Distribution by region	15.9%	9.2%	16.0%	3.6%	18.9%	9.2%	3.9%	7.2%	5.8%	10.3%	100.0%
Colonies (no.)	118,696	225,936	83,634	376,427	45,718	289,148	75,593	113,619	324,958	580,462	2,234,191
Distribution by region	5.3%	10.1%	3.7%	16.8%	2.0%	12.9%	3.4%	5.1%	14.5%	26.0%	100.0%
Colonies per farm (no.)	50	167	35	709	16	212	131	107	379	382	151
Farms selling colonies (no.)	122	79	110	37	131	78	32	70	52	63	773
Distribution by region	15.8%	10.2%	14.2%	4.8%	16.9%	10.1%	4.1%	9.1%	6.7%	8.0%	100.0%
Colonies sold (no.)	8,168	7,310	1,583	15,196	1,573	6,249	1,555	6,921	13,541	14,292	76,398
Distribution by region	10.7%	9.6%	2.1%	19.9%	2.1%	8.2%	2.0%	9.1%	17.7%	18.7%	100.0%
Colonies sold per farm (no.)	67	93	14	411	12	80	49	99	260	227	99
Share of farms selling colonies	5.2%	5.8%	4.7%	7.0%	4.7%	5.7%	5.5%	6.6%	6.1%	4.1%	5.2%
Honey produced by region	1,671	1,066	1,512	437	1,619	978	411	557	639	1170	10,062
Distribution by region	16.6%	10.6%	15.0%	4.3%	16.1%	9.7%	4.1%	5.5%	6.4%	11.6%	100.0%
Colonies producing honey (no.)	117,325	225,416	82,085	376,256	43,403	288,404	75,272	112,844	324,563	579,846	2,225,413
Honey produced (thous. pounds)	7,949	16,980	5,013	25,328	1,751	19,216	5,997	6,198	19,636	20,407	128,475
Distribution by region	6.2%	13.2%	3.9%	19.7%	1.4%	15.0%	4.7%	4.8%	15.3%	15.9%	100.0%
Honey produced per farm (pounds)	4,757	15,928	3,316	57,958	1,081	19,648	14,592	11,128	30,730	17,442	12,768
Share of farms producing honey	71.0%	78.7%	64.1%	82.3%	57.9%	71.8%	71.2%	52.4%	74.5%	77.0%	68.1%

Source: Data compiled by USDA, Economic Research Service using 2002 Census of Agriculture.
^a Farms with colony inventory, colonies sold, or honey produced.